Conservative Amputation in Arteriosclerosis Obliterans

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SUMMARY

Sixty-three toe and leg amputations in patients with arteriosclerosis obliterans were reviewed in an attempt to determine how often and under what conditions a toe or leg amputation gave satisfactory results, and when transmetatarsal amputation might better have been considered. In many cases in which toes were amputated, it was necessary later to amputate the leg or the thigh because of improper healing or spread of infection. Transmetatarsal amputations apparently heal frequently in carefully selected cases and permit better function in the foot than do toe amputations. Successful use of a prosthesis is not obtained in many cases after leg amputation. When this difficulty is anticipated transmetatarsal rather than leg amputation should be attempted, if other conditions warrant, since prosthesis is not necessary after transmetatarsal amputation.

McKITTRICK and co-workers[3] recently reported encouraging results from transmetatarsal amputation in patients who had both arteriosclerosis obliterans and diabetes mellitus. They stated that patients who formerly would have been subjected to amputation of one or more toes or even of part of the leg received more benefit from the transmetatarsal operation.

To appraise the conclusion reached by McKittrick and co-workers, a study was made of case records with a view to determining, first, how often and in what circumstances toe or leg amputation gave satisfactory results, and, second, whether transmetatarsal amputation might better have been considered.

REVIEW OF CASES

At Los Angeles County Hospital histories were reviewed of 49 unselected cases of patients with arteriosclerosis obliterans, some of them with diabetes mellitus, upon whom amputation of a toe or toes or through the leg had been performed because of a lesion related to ischemia. A total of 63 amputations had been done on 57 limbs. Ages of the patients at the time of amputation ranged from 40 to 82 years; the average was 63 years. Thirty-two were men and 17 women. Of the 57 limbs that were operated upon, 43 were those of patients who had diabetes mellitus. One patient who underwent amputation on both limbs had had Raynaud's phenomenon for many years in addition to arteriosclerosis obliterans. All the amputations were performed at least three and one-half years before the study here reported, an interval adequate for follow-up.

One or more of the toes were removed in 30 of the amputations and part of the leg in 33. After 21 of the toe amputations a subsequent amputation to the leg or thigh was carried out (six of these operations are included in the 33) because healing did not progress notably in one or two months or because of spreading infection. In three instances the patient died after the second amputation.

Healing took place after only nine (30 per cent) of the toe amputations (Table 1), and was usually slow. In many instances considerable distortion of the remaining toes occurred after operation, and in most such instances callus and ulceration developed on the metatarsal heads, on the outer aspects of the first or fifth toes, or on the toes adjoining the amputation site. Removal of the great toe did not appear to cause the patient great difficulty in balancing or in stepping forward to walk. The over-all impression of results from toe amputation was not encouraging, even when allowance was made for the greater age and poor general condition[1] which commonly are factors in patients in charity hospitals.

Healing occurred in 24 of the 33 cases in which amputation through a leg was carried out, and it was much more rapid than after toe amputations. In the other nine cases the patient either died postoperatively or later underwent thigh amputation. Of the 24 patients with amputations that healed, nine did not use prosthesis, and of the 15 who did, only four continued use of the device for a year or more. Some of the patients who did not use a prosthesis for a full year probably could have done so. Eight of those who did not use a prosthetic device at all or abandoned its use within the first year, nevertheless seemed to benefit from the amputation, for they had greater use of the limb (as in turning in bed or sitting) than they could have had after amputation through the thigh. Among the reasons for abandoning or not using a prosthesis were these: The patient found crutches satisfactory; the patient died of other causes in the year after the prosthesis was applied; the prosthesis was difficult

TABLE 1.—*Amputation in Arteriosclerosis Obliterans.*

	Total Number	Healed	Reamputated	Died
Toe	30	9 (30%)	21	3*
Leg	33	24 (73%)	5	4

*All died after reamputation.

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TABLE 2.—*Use of Prosthesis in Leg Amputation*

Number Successfully Amputated	Used prosthesis for over one year	Could not use prosthesis	Use of prosthesis conditional or uncertain
24	4	9	11*

*These 11 benefited somewhat from the leg amputation (as opposed to a thigh amputation) even though they did not use a prosthesis for at least one year.

to use because the other limb also had or needed a prosthesis; pressure of the prosthesis caused recurrent ulcers; or contracture of the knee developed. The subsequent use of the limb upon which operation is done is important because most of the patients were alive two to ten years after amputation.

Death followed amputations in seven cases, in four of which amputation of the leg was carried out, and in the other three amputation of a toe or toes, followed by amputation of the thigh (during the same hospitalization) when that became necessary because of spreading infection in one case and non-healing in two. In all seven cases death was related to cardiovascular disease and/or sepsis.

DISCUSSION

In the present group of elderly patients with arteriosclerosis obliterans, many with diabetes mellitus, toe amputations usually did not heal. McKittrick in 1939 reported healing in only ten per cent of such cases.[2] His advice at the time was the performance of thigh (supracondylar) amputations in a greater number of cases. However, in light of his more recent experience with transmetatarsal amputation it would appear that this operation might well be tried more often instead of toe amputation if local conditions are conducive to technical success and if arterial insufficiency in the patient is only moderate.

In the cases studied, neither sex, age, the presence of diabetes, nor the palpability of the arterial pulses *alone* appeared to be correlated with the success of the amputation. Apparently in the selection of the site for amputation no one of these indices can take the place of an adequate survey of the degree of arterial insufficiency present as measured by arterial pulses, claudication distance, pallor of the limb when elevated and rubor when dependent, appearance of the skin, speed of color return (venous filling time), ischemic pain on rest, and the implication of any trauma in the production of the lesion.*

The evidence presented concerning the healing and usefulness of the limb after amputation of the leg suggests that transmetatarsal amputation might well be tried in place of leg amputation in some cases, especially in those in which it is suspected that the patient will not be able to wear a prosthetic device. As transmetatarsal amputation makes greater demands on the peripheral circulation, careful appraisal of the adequacy of the supply of blood must be made, since unsuccessful amputation and consequent reamputation would entail a greater risk in a condition already associated with a high rate of operative mortality. The advantage of transmetatarsal amputation over amputation of the leg is that if healing takes place the limb can still bear weight without a prosthesis. This advantage sometimes makes the difference between an ambulatory and a partially invalid patient.

REFERENCES

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*It must not be forgotten that, as Samuels[4] has amply illustrated, many lesions of the toes can heal without surgical amputation if ideal conditions of treatment prevail, although the prolonged hospitalization or bed rest required and the financial considerations involved might make such therapy impracticable.